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ABSTRACT

This booklet on environmental decisions is one in a series on environmental education for grades K-12. The activities are designed to involve high school students actively in the decision making process. The effect of using laws as a vehicle for environmental improvement is also explored. Five basic behavioral objectives are developed with subject areas and activities. There are three optional activities per objective and each includes a listing of materials and resources, procedures, and discussion questions. The activities are interdisciplinary and contain mathematics problems, games and simulations, role-playing, and case studies. Illustrations, sample worksheets, and readings are also given. (MA)

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ENVIRONMENTAL DECISIONS



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ENVIRONMENTAL EDUCATION

VALUES FOR THE FUTURE

ANTIOCH COMMUNITY SCHOOL DISTRICT 34

TITLE IV C ESEA

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EXPLANATION OF CONCEPT AREA

DECISIONS - For students to be effective in solving environmental problems they must have numerous experiences in a learning situation. By solving carefully selected problems they acquire the necessary skills and build their confidence.

Program activities begin by defining decisions and the responsibility for decisions.

In the second sequence we identify the aspects of sound decisions and their relationship to individual attitudes. We also explore the ideas of consequences and time span for decisions.

The junior high program attempts to identify the various components of complex decisions as they relate to decision-makers. From this we develop the ideas of effects and enforcement of decisions as they relate to individuals, society, and the law. We also begin to develop the concept of responsibility for decisions.

In high school we devote much of our efforts to involving students actively in the decision-making process. They are encouraged to practice their personal values and examine their relationship to society in general. Decisions take on new significance as the student becomes involved with groups whose interests may be different from his. We also explore the effect of using laws to effect environmental improvement.

DECISIONS 14

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to identify effective environmental decisions which consider the ecological, economic, political, social, and technological aspects of problems.

SUBJECT AREAS:

Social Studies, English, Language Arts

OPTION #1

MATERIALS AND RESOURCES

Site maps 1 and 2
Community Profiles
Cost sheet and time line
Worksheets

PROCEDURE:

1. Explain to the class that they are going to solve an environmental issue - Regionalized Sewage Treatment.
2. Break the class into six groups and give each group a community profile, worksheet, and budget sheets.
3. They must each deal with their own community's needs as they relate to the five points on the worksheet.
4. When they have all the materials, explain the following points:
 - a. Read all the community profiles with particular attention to your own community.
 - b. Study the cost sheet and the worksheet.
 - c. Answer all the points on the worksheet in writing and any others your group identifies.
 - d. They must be prepared to convince each of the other five groups to adopt their position.
 - e. Their position is the result of their profile and their answers to the worksheet questions.
5. After two periods of introduction, teacher observation, and development of positions, the class spends one period making the decision.
6. Select one person from each group to be the regional council of governments. These people must make the decision: to regionalize or not to regionalize
7. Give each team three minutes to make their presentation to the board.
8. After the presentations the board has three minutes to reach a decision on the issue.
9. While they are deciding hold a secret ballot of all the class members.
10. When the decision is reached by the board compare their decision with the class decision.

DISCUSSION QUESTIONS

During the position formulation periods you should have observed the groups' behavior. Review your reactions to their position development process.

How well did they understand the scale of the problem?

Was it too involved?

OPTION #1 cont.

Would they have considered all of these factors on their own?

Do they generally look at all problems in this way?

CLOSURE

Ask them to individually rank order each of the five categories. Tabulate the results for the class. Why don't they all agree on the most and least important factor?

1

OPTION #1

SITE MAP 1

2

3

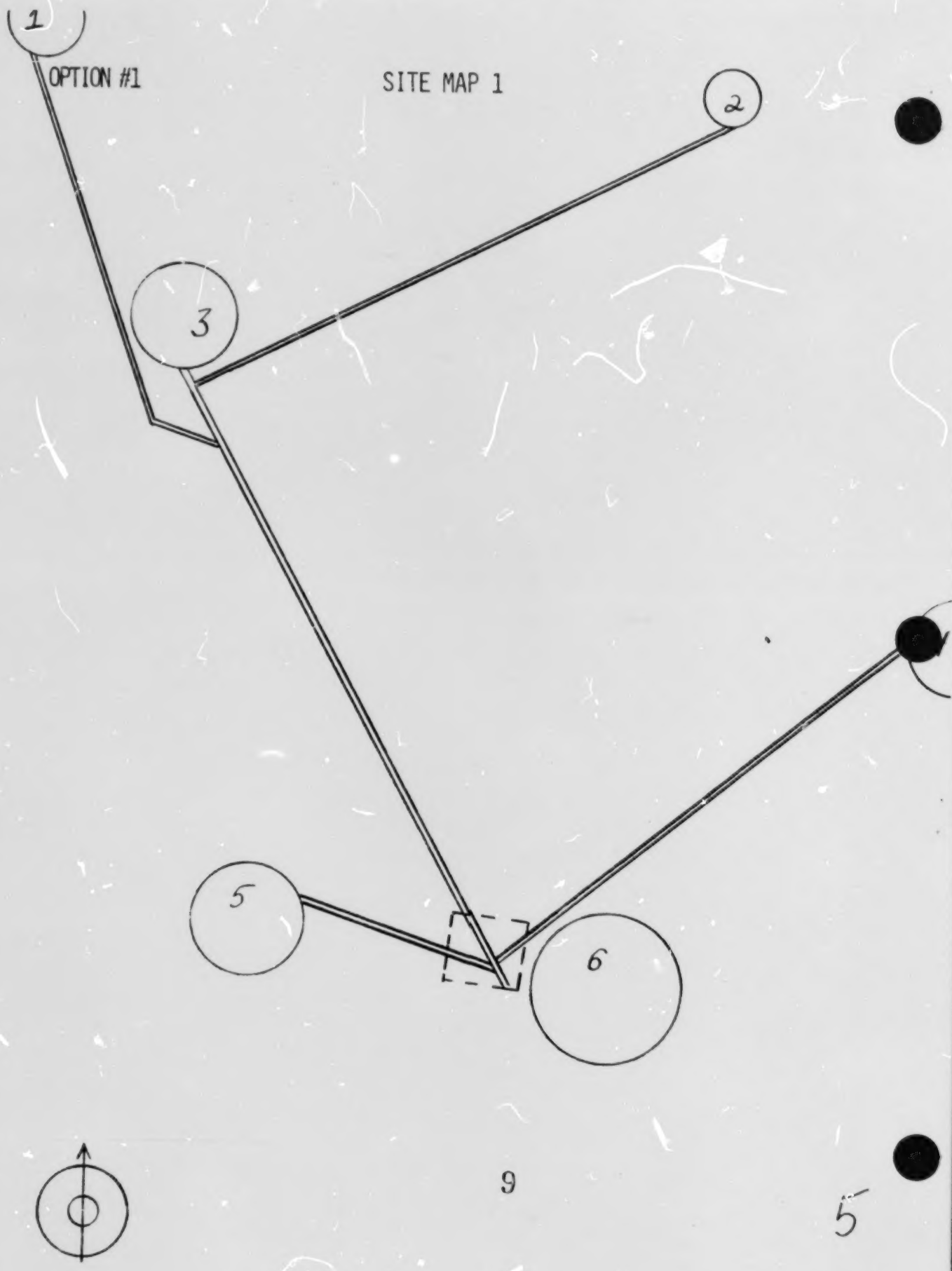
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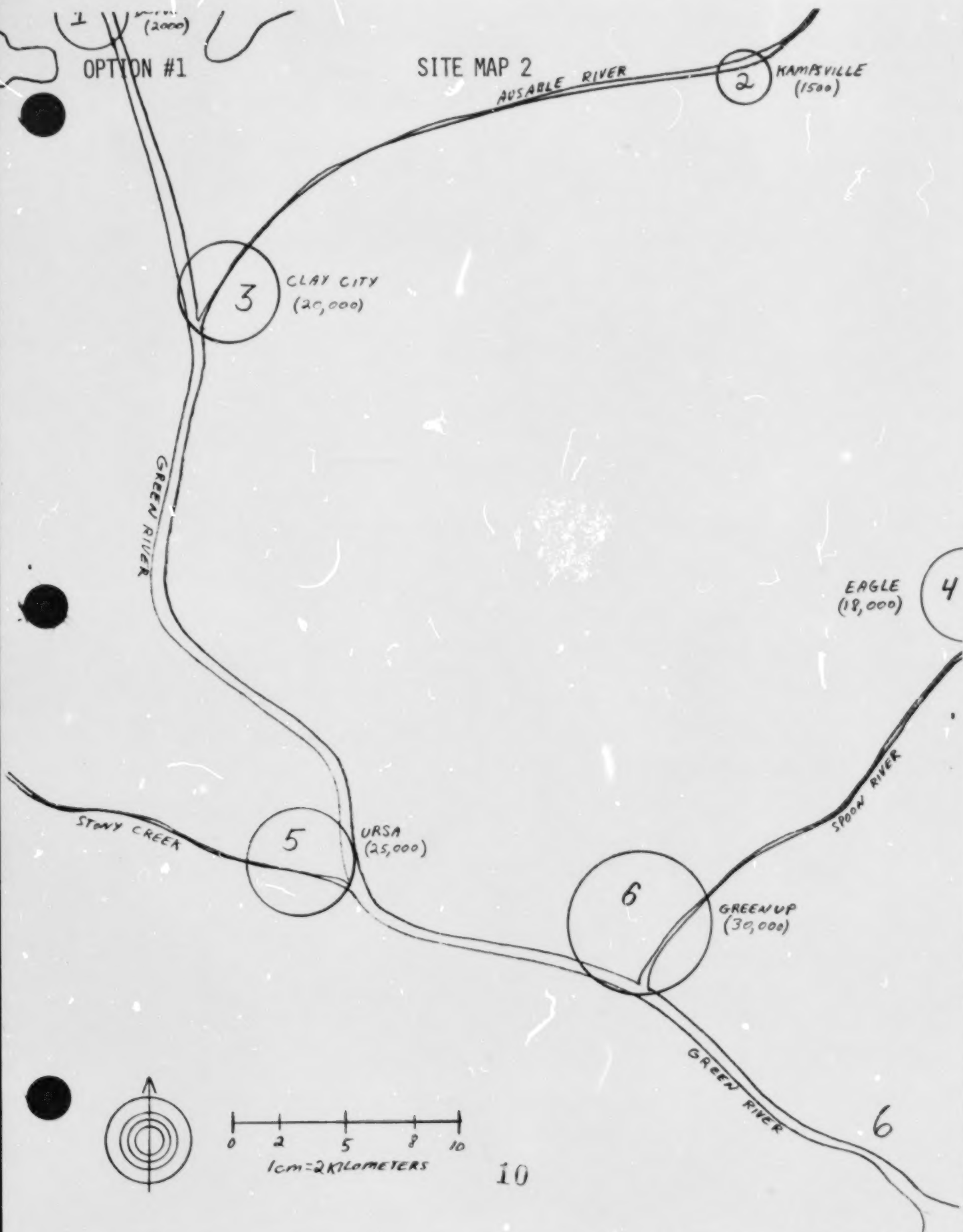
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SITE MAP 2

OPTION #1



#1 DePue (2000) A small town located on the north branch of the Green River. The principal interest of the area is recreation, site of the valley lakes region. The normal population is multiplied four times during the peak recreation seasons; fishing, hunting, snowmobiling, and skiing.

The town was formed by European immigrants in the late 1800's and has grown very slowly over the years. The people take pride in their independence and small town atmosphere. They are very provincial and, for the most part, distrust big government.

The town dumps all of its wastes into either the Green River or the dump south-east of the city. There is no treatment plant in town.

The majority of the people rely on Clay City ten miles away for their shopping and medical facilities. There are also a few people who work in Clay City in a small factory.

They place a high value on the natural beauty of their area and resent somewhat the intrusions made the tourist trade.

#2 Kampsville (1500) This small farming town is on the south branch of the Ausable River, 25 miles from Clay City. It serves as the hub of a very large agricultural area. the grain from local farms is stored here until it can be shipped to processing centers in the midwest.

The town was formed by German immigrants in the early 1800's and has not changed in almost thirty years. It is slowly becoming an old age community as the smaller farms become part of larger farms and young people leave for the city.

All of the town waste ends up in septic fields except for the large amount of grain spillage which is washed into the Ausable River. This is a serious problem for the people of Clay City because of the high nutrient quality of the grain.

#3 Clay City (20,000) This small industrial/recreational city is at the confluence of the Green and Ausable Rivers. While there is a good deal of small and medium industry in the city the major focus of the area is recreational. It draws people from all over the midwest for the annual fishing derbies and ski events on the river.

The town is a cross section of every ethnic group in the region and the socio-economic classes are about equally divided. The people tend to be consistent with national policies and goals related to environment and economics.

As one of the larger communities in the area it also supplies medical and commercial facilities for the smaller communities.

OPTION #1

COMMUNITY PROFILES CONT.

#4 Eagle (18,000) The town is a typical midwestern city with no outstanding features. The people are a wide mixture of ethnic, economic, social and educational classes.

The Spoon River is the only real focal point of the town. One of their favorite sons, the only famous one, wrote a series of mystery stories using the river as a background. The books are widely read and have made the town somewhat notorious. This has tied the town to the river somewhat. They have only minimal sewage treatment facilities.

#5 Ursa (25,000) This is the county seat and the focal point for government in the area. The majority of the decisions of any real consequence are made here.

It is a university town with more than half the town connected with the university (13,000 students).

There is a ready supply of scientists and respected authorities available to help the country agencies. These authorities have taken a real interest in the community and Ursa is becoming known as a progressive city with a strong environmental focus.

The people are a diverse group and seem willing to pay for whatever improvements are needed to help the community grow and prosper.

They get their drinking water from the Green River and put secondary treated water back.

#6 Greenup (30,000) At the northern edge of the confluence of the Spoon and Green Rivers this is the largest community in the region. It has grown very rapidly in the last ten years and is a mixture of new businesses, industrial and commercial, and residences.

Because of the rapid growth, the people are heavily taxed for roads, schools, and services. They have built a new sewage treatment plant that performs secondary treatment on their sewage.

There is a great deal of rivalry between Greenup and Ursa over which city will have the most say in local and regional affairs.

Often, the leaders of Greenup will oppose any action suggested by the leaders from Ursa just because the idea comes from Ursa.

Because the Green River is on the outskirts of town they don't feel much allegiance to or responsibility for the river.

REGIONAL SEWAGE PLANT DETAILS AND COSTS

TYPE OF PLANT: Tertiary treatment of sewage 99% effective. The H₂O could be used for drinking if treated as drinking water (flourine and clarifiers in the system).

CAPACITY: Able to treat sewage for 160,000 people at maximum in an emergency. Normal capacity would be 140,000 people.

COSTS:

Plant construction costs -	60% Federal	\$60,000,000
	40% local	40,000,000
	TOTAL	\$ 100,000,000

Pipe connecting all towns
(\$10,000/KM)

DePue-Clay City section	19 KM
Kampsville-Clay City section	25 KM
Clay City-Sewage Plant	26 KM
Eagle City-Sewage Plant	20 KM
Ursa-Sewage Plant	10 KM
TOTAL	100 KM

Individual Town Costs

Ursa	10 x \$10,000	\$100,000
Eagle	20 x \$10,000	200,000
Clay City	(.82) x (26) x (\$10,000	213,200
DePue	19 x (10,000) + (.1) (26) (10,000)	216,000
Kampsville	(25) (10,000) + (.08) (26) (10,000)	270,800
		<u>\$1,000,000</u>

Additional Costs

6% interest on \$41,000,000 over ten years	\$12,175,000
--	--------------

TOTAL COSTS

PLANT	\$40,000,000
PIPES	1,000,000
INTEREST	12,175,000
	<u>\$53,175,000</u>

POPULATION SERVED: 96,500

Additional cost/person	\$551.00 over ten years
Additional cost/person/year	\$55.10 for ten years

OPTION #1

WORKSHEET

Social Factors - What is the community's attitude toward cooperating with and being tied to the five other communities in a joint effort (list all identifiable attitudes).

Technical Factors - Can this plant handle all of our wastes and is it a proven type of plant? Can we really regionalize to treat this large of an area? What will happen if we get new industry and new types of sewage?

Ecological Factors - Does the area need this level of treatment? Is the river worth saving? Is there a better place for the plant? Can we afford to take this much water out and pipe it to one central spot? Will the river dry up? Is regionalization proven to be environmentally sound?

Political Factors - How will this affect local government? Will we be controlled by the sewage plant capacity? Will the taxes be controlled locally and fairly in the region? Will we have autonomy for other area decisions? Will small towns have a fair say in handling the affairs of the plant?

Economic Factors - Is this the most economical method? Is everyone sharing equally in the costs? Does everyone receive equivalent benefits? What about cost overruns? Are there hidden costs? How do we know the accounting is accurate?

These are sample issues. Try to identify others that affect the total problem and the decision involved.

OPTION #2

MATERIALS AND RESOURCES

Planet Management Game , Houghton Mifflin Company
Aspect Identification sheet
Project guide ditto
Transparency markers

PROCEDURE:

1. The game has a complete set of rules. When you review the rules pay particular attention to the information about the planetary status ledger. It is important for the students to see the interaction of each index.
2. Break the class into five groups and appoint one person as a record keeper for the class.
3. Give each group a Project Guide ditto and an Aspect Identification chart. Explain that each group must record their decisions in the decision record column of the aspect identification chart.
4. Proceed through the ten steps of the game and have the recorder keep track of the progress of each group on the transparencies.
5. After the groups have all completed the rounds discuss the discussion questions.

DISCUSSION QUESTIONS

1. What did it take to win this simulation?
2. How did the separate decisions interact to "win" the simulation?
3. How do the factors become political?
4. Do any of the factors (social, political, etc.) not become part of the winning strategy?
5. How did the decisions in each group differ?
6. Did you change your view of the best budget as the program progressed? Why?
7. Would you have eliminated any of the factors in your budget? Explain.

OPTION #2

PROJECT GUIDE

RED CARDS

- A No project in this color group.
- B Clear more land and prepare it for raising crops.
- C Import chemical fertilizers and pesticides.
- D Buy machinery to plant, cultivate, and harvest crops.

BLUE CARDS

- E No project in this color group.
- F Conduct research to develop new varieties of corn, wheat, and rice with higher yields per acre.
- G Conduct research to identify the cause and cure of Holobinkitis.
- H Conduct research to find better ways to mine and use Walterite.

ORANGE CARDS

- I No project in this color group.
- J Build more Walterite mines and purification plants.
- K Build more highways and railroads to connect towns.
- L Construct new electric power plants.

YELLOW CARDS

- M No project in this color group.
- N Build more schools, for all age groups and for general, professional, and technical education.
- P Pay people to go to graduate schools of civil engineering, biochemistry, medicine, and agriculture.
- Q Finance the "Einstein Plan". This would a) send a few of the most capable individuals to Earth for advanced study, and b) connect more Clarion homes to the educational television network.

GREEN CARDS

- R No project in this color group.
- S Construct more and improved sewage treatment plants for city and factory wastes.
- T Finance the Wright Plan: a) buy areas of land around lakes and oceans to be used for recreation, b) build mile-high apartment buildings surrounded by 100 acre parks in the center of cities.
- U Equip more chimneys of homes, industries, and other buildings with antismoke equipment.

OPTION #2

ASPECT IDENTIFICATION SHEET

FACTORS	CARDS	DECISION RECORD (RECORD ALL CHOICES)
SOCIAL	K,L,N,P,Q	
ECOLOGICAL	B,C,S,U	
ECONOMIC	D,H,J	
TECHNOLOGICAL	F,G	
POLITICAL	T	

VARIABLE TOTALS

	ROUNDS									
	1	2	3	4	5	6	7	8	9	10
POPULATION										
INCOME										
FOOD										
ENVIRONMENT										

OPTION #3

MATERIALS AND RESOURCES

Factor balance sheet

Data sheets on returnables versus throwaways

PROCEDURE:

1. Present the class with the problem of proposing a means of getting a ban on non-returnable bottles. Tell them their task is to be certain they can identify all of the interest groups involved in the issue.
2. Help them fill in the FOR and AGAINST chart for as many groups as possible. Assign values according to the power to affect the decisions. Ten would be maximum and one would be the lowest.
3. Upon completion, total the pluses and minuses and evaluate the success of a possible solution to the problem.
4. Now select the top five interest groups on each side and have half of the class write a solution to appeal to them and the other half to appeal to the top five on the other side.
5. At this point you should have two similar solutions that reflect opposite viewpoints of the problem.
6. Discuss the results.

DISCUSSION QUESTIONS

1. What is power?
2. Who has power? Why?
3. How do you appeal to power?
4. What should decision-makers do to be truly effective?
5. How do you think decisions are being made in our area? (town, state, county)
6. Must we consider economic, political, social, ecological, and technological factors in all decisions? Explain.
7. Is one factor more important than another?

OREGON'S BOTTLE BILL: THE FIRST SIX MONTHS

The Law

Oregon's "Bottle Bill," signed into law in June 1971 by Governor Tom McCall, went into effect October 1, 1972. The Act required a minimum 2-cent refund to purchasers on the return of "certified" containers of beer, malt beverages, and carbonated soft drinks; and a 5-cent refund on the return of all other beverage containers. Certified containers are defined as containers that are used by, and that will be accepted for reuse by, more than one manufacturer. In addition, the law outlaws the sale of the flip-top or pull-tab beverage container.

Industry reaction to the measure was predictably negative, and suit was filed January 24, 1972, in the Circuit Court of the State of Oregon by various container manufacturers, brewers, and soft drink manufacturers who claimed that the Oregon law was unconstitutional. The plaintiffs argued: (1) that the statute violates the commerce clause of the U.S. Constitution by imposing an excessive burden on interstate commerce, and by favoring local concerns at the expense of distant interstate operators; (2) that the statute violates the equal protection clause of the U.S. Constitution by differentiating between carbonated and non-carbonated soft drinks and between reusable and nonreusable containers.

Effectiveness of the Law

In a 1972 study by Research Triangle Institute, beverage containers were estimated to constitute 19.1 percent of roadside litter by item count. The breakdown by container type was 73.1 percent cans, 17.0 percent nonrefillable bottles, and 9.9 percent refillable bottles. By container content, beer represented 71.3 percent, soft drinks 25.7 percent, and wine and liquor 3.0 percent of all beverage containers in litter.

Beverage containers contributed a far greater percentage of the volume of roadside litter. A survey conducted by the State of Oregon indicated that beverage containers formed approximately 67 percent of the volume of litter.

Shortly after the bottle bill was passed in 1971, litter surveys were made on a monthly basis by the Oregon State Highway Department. Beverage-related items totaled less than 2 percent of the total for the period since the law went into effect. Other litter studies, including the study for Keep America Beautiful, Inc., by Research Triangle Institute, showed beverage-related paper as representing below 12 percent of total litter.

Preliminary comparisons between the winter prior to enactment (1971-1972) and the present winter (1972-1973), for example, revealed that the law had a significant and positive impact on litter in Oregon (Table 1). For these winter months for which litter data were collected in 1971 and 1972, beverage containers averaged 7,787 per month based on 29 one-mile surveys. This represented 269 items per mile per month. Data for the winter after enactment of the legislation showed a definite drop. For the three winter months of 1972 to 1973, there were 1,274 containers littered per month based on 25 one-mile surveys, for an average of 51 items per mile. This was a decrease of 81 percent, or 218 items per mile per month. The proportion of beverage containers in litter also dropped significantly, from 37 percent before enactment to 18.9 percent after the law went into effect.

Impact on Industry

Although the initial effects of the law appear to indicate positive litter reduction, the bottle bill has also been attended by some disruption in the beverage and beverage container industries. The law apparently affected container usage and sales.

Oregon's Bottle Bill cont.

Container Usage

Prior to enactment of the bottle bill, the Oregon National Soft Drink Assn. reported that approximately 51 percent of all soft drinks were sold in refillable bottles, 8 percent in nonrefillable bottles, and 41 percent in cans. This mix of containers changed significantly after October 1, 1972. In March 1973, no nonrefillable soft drink bottles were being sold in the State. Cans had declined to less than 1 percent of the total soft drink market. Only Shasta Beverages, a warehouse brand distributor, continued to sell soft drinks in cans.

In December 1971, the Oregon Liquor Control Commission reported that approximately 35 percent of all beer in Oregon was sold in cans. During the first month of enactment of the law, the percentage of cans decreased to 4.3 percent. This percentage declined still further, and by December 1972, 99.5 percent of all beer was being sold in refillable bottles, with only 0.5 percent sold in cans. This shift resulted in lower cost to the consumer, as beer in cans sold in March 1973 at six for \$1.58 (including a 30-cent deposit), while certified refillable bottles of beer sold at six for \$1.17 (including a 12-cent deposit).

Prices and Sales

By March 1973, the Oregon market had seen neither a decrease in sales nor an increase in prices since the law had gone into effect. In fact, beer sales for the fourth quarter of 1972 showed an increase of 40,000 barrels over the fourth quarter of 1971, according to the Oregon Liquor Control Commission. (This represented an increase in beer excise taxes collected by the State of Oregon of \$52,000.) Sales of soft drinks, while not indicating an increase, did not indicate any unseasonal decrease either.

As of March 1973, retailers in the State indicated that no retail prices had increased, and Oregon consumers were purchasing beer and soft drinks at lower prices on the average than prior to the enactment of the law. This is because refillable bottles, which now account for almost all of beer and soft drink sales, are considerably cheaper for the consumer to purchase than nonrefillable bottles and cans.

Container Industry

The metal container industry has been adversely affected by the Oregon bottle bill. National Can Corporation, the largest metal can supplier to the Oregon market prior to October 1, 1972, had to close one of its plants in Yakima, Washington. This, in conjunction with minor shutdowns in other plants serving the area, resulted in a total layoff of 82 employees.

Glass container manufacturers, while gaining in market share, have had to change from nonrefillables to refillable bottle production exclusively. If trippage rates are high (if each refillable bottle is returned and reused many times), the glass container industry could experience a sales decline. No estimates are yet available on the impact of the law on this industry.

Contract Canners

The State of Oregon had only one contract canner, Emerald Canning Corporation, prior to October 1, 1972. Emerald Canning recently announced that it could no longer continue to can soft drinks. Approximately 60 employees were terminated as a result. It is anticipated that much of the volume once sold in cans will be sold in refillable bottles

Oregon's Bottle Bill cont.

Soft Drink Industry

Most bottlers experienced a gain in market share, although this required increased investment in capital equipment to wash, fill, and deliver refillable bottles. It seemed likely that, assuming no sales decline, employment decreases in the canning sector would be partially offset by employment increases in bottling plants.

Brewing Industry

The effect of the Oregon legislation on the brewing industry has been mixed. Brewers operating in the Pacific Northwest have been favored, while shipping brewers (national brand beer producers who ship their beer from outside the Pacific Northwest) have suffered adverse effects. Approximately 88 percent of all non-bulk beer sales in the State since October 1 have been in certified 2-cent deposit bottles.

Brewers within the States of Oregon and Washington have been positively affected by the bill. Because of their efficient distribution systems, and because the shipping distance has been minimal, the regional brewers have been able to acquire as many 2-cent deposit bottles as they can use. Since new refillable bottles cost as much as five times the deposit values, these brewers have experienced a decrease in costs.

National Brewing Company, located in Phoenix, Arizona, increased its shipping costs into Oregon by 38 percent (from 32 to 44 cents per case) due to the weight and breakage factors associated with refillable container distribution. The cost of returning the empty containers to Phoenix would be an additional 28 cents.

Retail Stores

Oregon food retailers have already been inundated with empty beer and soft drink containers. This has resulted in increased costs to the retailer for handling the returned bottles. Some additional markup may be required although no increases in price were passed on to the consumer as of March 1973.

Retailers have also had substantial space problems due to the additional quantities of returned containers. Increased pickups and deliveries by bottlers were expected to minimize space problems.

Trends

The beverage container portion of litter decreased by at least 49 percent between winter of 1971 to 1972 and winter of 1972 to 1973.

Container usage has been dramatically altered by the law. Less than 1 percent of all soft drinks and 0.5 percent of all beer was being sold in cans as of March 1973.

The enactment of the law has been attended by an initial loss of 142 jobs. A sizeable number of new jobs may be created in the bottling industry to offset these losses.

Taken from U. S. Environmental Protection Agency pamphlet, 1973.

A COMPARISON OF OREGON LITTER DATA BEFORE AND AFTER MINIMUM DEPOSIT ACT*

	Before Enactment					After Enactment					Winter average comparison per mile before/ after
	Oct-Nov 1971	Dec. 1971	Feb. 1972	Winter average	Winter average per mile	Nov. 1972	Jan. 1973	Feb. 1973	Winter average	Winter average	
total beverage containers	8,527	9,580	5,254	7,787	269	1,705	949	1,168	1,274	51	-81.0%
Returnable	971	1,060	689	907	32	316	272	335	308	12	-62.5%
Nonreturnable	7,556	8,520	4,565	6,880	267	1,389	677	833	966	39	-85.4%
total other litter	15,860	11,440	12,357	13,219	456	7,052	4,896	4,470	5,473	219	-51.9%
total all items	24,387	21,020	17,611	21,006	728	8,757	5,845	5,638	6,747	270	-62.9%
average container percentage of total	34.9	45.6	29.8	37.0	37.0	20.7	16.2	19.4	18.9	18.9	-49.1%

Source: Oregon State Highway Department Litter Survey

OPTION #3

FACTOR BALANCE CHART

FOR	VALUE	AGAINST	VALUE
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
TOTALS		TOTALS	

DECISIONS 15

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to identify the trade-offs involved in making an effective environmental decision.

SUBJECT AREAS:

Mathematics, Social Studies

OPTION #1 - one to two periods

MATERIALS AND RESOURCES

Answer sheets
Problem sheet
Worksheet

PROCEDURE:

1. Give each student a problem sheet and ask them to determine which is the best method to control litter, on a cost basis.
2. When they complete the mathematics assign them to one of the group of multipliers (customer relations, esthetics, or effectiveness) to see if they can develop a reasonable explanation for the different values.

DISCUSSION QUESTIONS

1. Which choice is the best on a cost basis? Is this the choice made by most shopping centers?
2. What are some other possible solutions?
3. Why do the different factors vary from choice to choice?
4. Is esthetics a factor in all decisions? Explain.
5. If money were no object which method would you chose? Explain.
6. What are the trade-offs associated with each choice?

OPTION #1

PROBLEM SHEET

PROBLEM: DETERMINE THE BEST WAY (\$ AND AESTHETICS) TO KEEP A 40,000' SQUARE AREA CLEAN FOR TWELVE HOURS A DAY SIX DAYS A WEEK.

CHOICE A

LITTER BARRELS: LAST FOUR YEARS, \$500/BARREL PLUS \$5/YEAR FOR BAGS/BARREL (3/4 HR/DAY TO CLEAN)

CHOICE B

CLEAN-UP MAN: \$4.50/HOUR, CLEANS EVERY TWO HOURS, TAKES ONE HALF HOUR, ALSO CLEANS THE DIRT TRACKED IN

CHOICE C

SIGNS AND ONE BARREL: ONE CENTRAL BARREL @ \$1000 AND ONE SIGN AT \$300 TO EDUCATE PEOPLE ABOUT LITTER AND MAKE THEM EAGER TO HELP CLEAN THE AREA. THE BARREL WILL LAST FIVE YEARS AND THE SIGN WILL LAST TWO YEARS.

CHOICE D

CLOSE THE SOURCE OF LITTER, THE ONLY REFRESHMENT STAND. IT PAYS \$115/WEEK IN RENT THAT WOULD BE LOST.

OPTION #1

WORKSHEET

CHOICE A

COSTS:

BARREL/YEAR

BAGS/YEAR

LABOR/DAY

LABOR/YEAR

SUBTOTAL

500⁰⁰
 500
 3.38
 1053.00
 # 1558⁰⁰

SUBTOTAL X CUSTOMER RELATIONS FACTOR

A X ESTHETICS FACTOR

B X EFFECTIVENESS FACTOR

1558⁰⁰
 1402⁰⁰
 1542.42

TOTAL COSTS

1542.42

CHOICE B

COSTS:

DAILY LABOR COSTS

YEARLY LABOR COSTS

SUBTOTAL

1350
 4212
 # 4212⁰⁰

SUBTOTAL X CUSTOMER RELATIONS FACTOR

A X ESTHETICS FACTOR

B X EFFECTIVENESS FACTOR

10,530⁰⁰
 15,795⁰⁰
 13,425⁷⁵

TOTAL COSTS

13,425⁷⁵

CHOICE C

COSTS:

BARREL/YEAR

SIGNS/YEAR

SUBTOTAL

200⁰⁰
 150⁰⁰
 # 350⁰⁰

SUBTOTAL X CUSTOMER RELATIONS FACTOR

A X ESTHETICS FACTOR

B X EFFECTIVENESS FACTOR

1050⁰⁰
 1260⁰⁰
 1575

TOTAL COSTS

1575⁰⁰

OPTION #1

WORKSHEET CONT.

CHOICE D

COSTS:

RENT/WEEK

RENT/YEAR

SUBTOTAL

SUBTOTAL X CUSTOMER RELATIONS FACTOR

A X ESTHETICS FACTOR

B X EFFECTIVENESS FACTOR

TOTAL COSTS

115⁰⁰
 5980⁰⁰
 # 5980⁰⁰
 # 8970⁰⁰
 4485⁰⁰
 3588⁰⁰
 # 3588⁰⁰

Customer Relations Factors

Choice A X 1.0
 Choice B X 2.5
 Choice C X 3.0
 Choice D X 1.5

These factors must be given to the students for their computations.

\$1558.00
 \$10530.00
 \$1050.00
 \$8970.00

Esthetics Factor

Choice A X .9
 Choice B X 1.5
 Choice C X 1.2
 Choice D X .5

These factors must be given to the students for their computations.

\$1402.00
 \$15795.00
 \$1260.00
 \$4485.00

Effectiveness Factor

Choice A X 1.10
 Choice B X .85
 Choice C X 1.25
 Choice D X .80

These factors must be given to the students for their computations.

\$1542.42
 \$13425.75
 \$1575.00
 \$3588.00

OPTION #1

WORKSHEET

CHOICE A

COSTS:

BARREL/YEAR

BAGS/YEAR

LABOR/DAY

LABOR/YEAR

SUBTOTAL

SUBTOTAL X CUSTOMER RELATIONS FACTOR

A X ESTHETICS FACTOR

B X EFFECTIVENESS FACTOR

TOTAL COSTS

CHOICE B

COSTS:

DAILY LABOR COSTS

YEARLY LABOR COSTS

SUBTOTAL

SUBTOTAL X CUSTOMER RELATIONS FACTOR

A X ESTHETICS FACTOR

B X EFFECTIVENESS FACTOR

TOTAL COSTS

CHOICE C

COSTS:

BARREL/YEAR

SIGNS/YEAR

SUBTOTAL

SUBTOTAL X CUSTOMER RELATIONS FACTOR

A X ESTHETICS FACTOR

B X EFFECTIVENESS FACTOR

TOTAL COSTS

OPTION #1

WORKSHEET CONT.

CHOICE D

COSTS:

RENT/WEEK

RENT/YEAR

SUBTOTAL

SUBTOTAL X CUSTOMER RELATIONS FACTOR

A X ESTHETICS FACTOR

B X EFFECTIVENESS FACTOR

TOTAL COSTS

OPTION #2

MATERIALS AND RESOURCES

Problem and proposal sheet

PROCEDURE:

1. Read the problem to the class and give them the sheet of the problem and the proposals.
2. They must each select a proposal or group of proposals and write an analysis and detailed explanation for their choices.
3. They must identify the trade-off involved in their decisions.

DISCUSSION QUESTIONS

1. What are some of the trade-offs you have identified in your proposals?
2. Why are trade-offs necessary?
3. What did you use as a basis for reaching your decision?
4. What are some other reasonable solutions to the problem of energy reduction?

OPTION #2

PROBLEM AND PROPOSAL SHEET

PROBLEM

We must reduce energy consumption for transportation by fifteen percent to enable the United States to reduce its dependence upon foreign oil. Your task is to evaluate each of the proposals to determine which is the best solution to the problem.

Your area of concern is the 20 mile radius of a large city of 1.5 million people. On a daily basis there are 9 million people using some form of transportation:

60%	31-40 miles/day
20%	21-30 miles/day
10%	11-20 miles/day
10%	0-10 miles/day

PROPOSALS

1. Limit all vehicles to 45 MPH on major streets and time all lights to move people in and out of the city faster during rush hour. Make certain that enforcement is rigid and convincing.

ENERGY SAVINGS: 12%

COST: Minimal

2. Assign speed limits according to the E.P.A. MPG rating for a type of car. Any car certified to get 20+ miles per gallon can go 70 MPH on highways. The limits would be scaled as follows:

MPG	TOP SPEED
20+	70
15-20	60
10-14	55
less than 10	50

Enforcement would be strict and expensive. MPG ratings would be according to E.P.A. specifications.

ENERGY SAVINGS:

15% immediately but close to 20% over the long term as small cars and high efficiency engines became popular.

COST: Nothing

Problem and Proposal sheet cont.

3. Encourage mass transit use in the area. Reschedule busses and trains to serve the commuter. Provide low cost tickets for regular users at a ten percent discount. Free tolls for cars with 2+ people in them. Set up park-ride centers on the outskirts for commuters. Establish mini-bus routes within the center city to minimize cab use. Raise parking fees to discourage center city auto. Improve the quality of all mass-transit vehicles.

ENERGY SAVINGS: 20-25% COST: \$10/person/year - \$15 million

4. Reschedule planes serving the city to increase their percentage of filled seats. Rotate the carriers on routes so that planes leave as they are filled or above 85% filled. No plane would leave until at least 85% of the seats are filled.

ENERGY SAVINGS: 5-8% COST: None, but a great loss of convenience

5. Assign specific taxi routes and inspect the cabs often. The taxis would be prohibited from cruising and given preferential routes to increase their efficiency. Only certain cabs could take the long trips outside the center city.

ENERGY SAVINGS: 2-5% COST: None

6. Establish quality bicycle paths for use within five miles of the city. These paths, together with secure storage areas in the center city, will enable a portion of the workers to eliminate their use of a car within the city for 8-10 months of the year.

ENERGY SAVINGS: 1-10% COST: Minimal

OPTION #3 - one period

MATERIALS AND RESOURCES

"Living in the Future Now, Science and Technology" FS/C BFA

PROCEDURE:

1. Explain that the filmstrip deals with the issue of changes to take place in the future and decisions to be made by all of us.
2. Read the asterisked (*) questions for them to think about during the filmstrip.
3. Show the filmstrip. NOTE: It might be effective to stop the cassette at certain points to discuss the question raised.

DISCUSSION QUESTIONS

1. Do we misuse technology?
- * 2. What have we lost (traded)?
- * 3. What have we gained?
4. What decisions can we make now about our lifestyle?
- * 5. Is science man-oriented and can we really make decisions (trades)?
6. Do we force the changes in science and technology or do we get forced into making decisions by technology?
7. What are we trading for genetically perfect children? Is this a fair trade?
- * 8. Are we able to control our destiny? Should we be able to do this?
9. Should science be limited to certain activities by the general population?
10. What are the trade-offs in the creation of people made to order?
- * 11. What trade-offs are you willing to make for technology?
- * 12. Have our decisions always been for the best (e.g. atomic energy, genetic research)?
13. Who should make the decisions on what to trade for what?

DECISIONS 16

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to relate feelings, attitudes, and values to the decision-making process.

SUBJECT AREAS:

Mathematics, Social Studies, Science, Language Arts

OPTION #1

MATERIALS AND RESOURCES

Worksheets

PROCEDURE:

1. Assign and distribute the worksheets for the students to work on independently.
2. When they complete the sheets correct them as a group and discuss the questions below.

DISCUSSION QUESTIONS

Set I

1. Did you realize before this moment the amount of air you needed?
2. With 25 persons in a classroom, windows and doors closed, thus no ventilation, what do you feel like physically after a half hour? Would you say the air was "used up"? Would you say it was polluted? Did you have a part in polluting the air? What substances were placed in the air by breathing? How do you feel about breathing in what others breathe out?
3. Suppose we use the same classrooms, no ventilation, and allow smoking in the room. If ten persons smoked through a half hour, what would be some physical reactions most non-smokers would feel? Would they feel the same effects if the room were ventilated? Is this a form of air pollution? What substance is placed into the air of the room that was not normally or previously there by the smokers? Why is smoking prohibited in public gathering places?
4. Is breathing the only source of pollution in the unventilated room? If the room were ventilated, is it possible that other pollutants could be introduced into the room? What might some of these be? What can be done either mechanically, chemically, or legislatively to reduce pollution?

Set 2

1. What form of transportation appears to be the leading contributor to air pollution? What is the second most serious contributor? What is the third most serious contributor?
2. Do you contribute to pollution via transportation? What can you do to reduce your transportation needs? What can you do to share your transportation vehicle with others? Can you modify your vehicle to reduce air pollution?

OBSERVATIONS - Set 2

1. What mode of transportation will move 240 people 500 miles with the least air pollution?
2. If you drove alone in your car 500 miles you could use approximately 36 gallons of gas, as compared to 11.6 on an airplane or 4.8 on a train. In view of the enormous consumption of gas for your car for a lone passenger, would you be willing to fly or ride the train instead of driving your car?

OPTION #1 cont.

3. If you drove your car the 500 miles and you were its only passenger, you could contribute 116 pounds of CO into the air. Flying, you would contribute only 37.1 pounds, and on the train 15.4 pounds. In view of this data, would you be encouraged to fly or take the train instead of driving alone?
4. The total pollutants per gallon of gasoline is about 3.7 pounds.

Set 3

1. If you have a large or medium car, would you be willing to choose a smaller car to reduce the pollutants you put into the air?
2. Do you feel honestly that your family is doing its share to control air pollution by driving properly? By having a smaller car? By driving only when necessary?
3. What do you think when you see a car leave a cloud of smoke behind its exhaust?
4. Do you know that a car leaves these pollutants even with pollutant controls, and even though no smoke is visible behind the exhaust?
5. With pollution facts in mind, plus your desire for comfort, safety, and power in a car, how will you weigh these factors in buying a car?
6. Emotionally you may buy a car for "beauty" or "style" or "speed". But if you really believed pollution reports and cared about your share, what kind of car would you buy?

Set 4

1. Which pollutants do you have a share in producing?
2. Which pollutants do you share in producing with your family? With your school? With your place of employment? With your recreation?
3. You purchase many items for your needs (food, shelter, clothing, occupational and recreational items, etc.). Which sources of pollutants are involved with producing these items for you?
4. Would you be willing to curtail some of your purchases and activities to help solve the pollution problem?
5. Do you see that you have, perhaps unknowingly, helped even in a small way to create the pollution problem?
6. Do you understand that control of pollution to keep the levels of pollution at a tolerable level is an important factor in your lifestyle?

BLEEP BLEEP POLLUTION! IT'S A DIRTY WORD!

AIR POLLUTION IS THE PRESENCE OF MATERIALS IN THE AIR WHICH ARE NOT NORMALLY FOUND IN THE AIR, E.G. SMOKE, PARTICLES, CARBON MONOXIDE, ETC.

PART I: MY FOOD AND AIR

PROBLEM 1 THE AVERAGE PERSON EATS AND DRINKS THE FOLLOWING TYPES OF FOODS IN THESE APPROXIMATE QUANTITIES MEASURED IN POUNDS AND OUNCES. FILL IN THE TOTALS AS INDICATED IN THE SPACES PROVIDED BELOW.

BREAKFAST: CEREAL 3 oz.; MILK AND OTHER LIQUID 12 oz.,
BREAD 5 oz., EGGS 3 oz.

LUNCH: BREAD 5 oz.; MEAT 3 oz., MILK OR OTHER LIQUID 10 oz.;
FRUIT OR OTHER DESERT 4 oz.

DINNER: VEGETABLES 6 oz.; MEAT 4 oz.; BREAD 5 oz;
LIQUIDS 12 oz.; DESERT 3 oz.

SNACKS: LIQUIDS 12 oz.; SOLIDS 6 oz.

	<u>OUNCES</u>	<u>POUNDS AND OUNCES</u>
TOTAL CONSUMED AT BREAKFAST:	_____	_____
TOTAL CONSUMED AT LUNCH:	_____	_____
TOTAL CONSUMED AT DINNER:	_____	_____
TOTAL CONSUMED AT SNACKS:	_____	_____
TOTAL FOOD CONSUMED DAILY:	_____	_____

CONCLUSION: THEREFORE, THE AVERAGE PERSON CONSUMES APPROXIMATELY
_____ POUNDS _____ OUNCES OF FOOD DAILY.

BLEEP BLEEP POLLUTION! IT'S A DIRTY WORD!!

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FRUIT OR OTHER DESERT 4 oz.

DINNER: VEGETABLES 6 oz.; MEAT 4 oz.; BREAD 5 oz;
LIQUIDS 12 oz.; DESERT 3 oz.

SNACKS: LIQUIDS 12 oz.; SOLIDS 6 oz.

	OUNCES	POUNDS AND OUNCES
TOTAL CONSUMED AT BREAKFAST:	<u>23</u>	<u>1# 7 oz.</u>
TOTAL CONSUMED AT LUNCH:	<u>22</u>	<u>1# 6 oz.</u>
TOTAL CONSUMED AT DINNER:	<u>30</u>	<u>1# 14 oz.</u>
TOTAL CONSUMED AT SNACKS:	<u>18</u>	<u>1# 2 oz.</u>
TOTAL FOOD CONSUMED DAILY:	<u>93</u>	<u>5# 13 oz.</u>

CONCLUSION: THEREFORE, THE AVERAGE PERSON CONSUMES APPROXIMATELY
5 POUNDS 13 OUNCES OF FOOD DAILY.

35

PROBLEM 2: THE AVERAGE PERSON NEEDS A WEIGHT IN AIR INTAKE EQUAL TO ABOUT SIX TIMES THE FOOD INTAKE. THEREFORE, THE AVERAGE PERSON NEEDS _____ POUNDS _____ OUNCES, OR APPROXIMATELY _____ POUNDS OF AIR EACH DAY.

PROBLEM 3: LUNG CAPACITY, IN BREATHING, IS APPROXIMATELY .9 CUBIC FEET. IF RESPIRATION RATE IS 15 BREATHS PER MINUTE, WHAT IS THE VOLUME OF AIR USED DAILY BY THE AVERAGE PERSON? _____

PROBLEM 4: CONSIDER THAT, FROM PROBLEM 3, EACH PERSON USES APPROXIMATELY 20,000 CUBIC FEET OF AIR DAILY. AT NORMAL AIR PRESSURE, RELATE THIS VOLUME TO A CLASSROOM WHICH MEASURES 25'x28'x10'. FIND THE VOLUME OF AIR IN THE CLASSROOM _____. HOW MANY CLASSROOMS OF AIR DO YOU USE DAILY? _____

PROBLEM 2: THE AVERAGE PERSON NEEDS A WEIGHT IN AIR INTAKE EQUAL TO ABOUT SIX TIMES THE FOOD INTAKE. THEREFORE, THE AVERAGE PERSON NEEDS 34 POUNDS 14 OUNCES, OR APPROXIMATELY 35 POUNDS OF AIR EACH DAY.

PROBLEM 3: LUNG CAPACITY, IN BREATHING, IS APPROXIMATELY .9 CUBIC FOOT. IF RESPIRATION RATE IS 15 BREATHS PER MINUTE, WHAT IS THE VOLUME OF AIR USED DAILY BY THE AVERAGE PERSON? $.9 \times 15 \times 60 \times 24 = 19,440$ cubic feet

PROBLEM 4: CONSIDER THAT, FROM PROBLEM 3, EACH PERSON USES APPROXIMATELY 20,000 CUBIC FEET OF AIR DAILY. AT NORMAL AIR PRESSURE, RELATE THIS VOLUME TO A CLASSROOM WHICH MEASURES 25'x28'x10'. FIND THE VOLUME OF AIR IN THE CLASSROOM 7000 cubic feet. HOW MANY CLASSROOMS OF AIR DO YOU USE DAILY? about 3

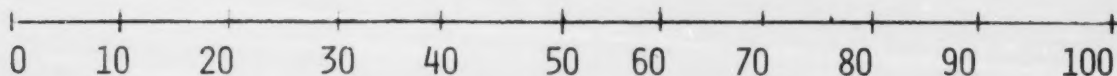
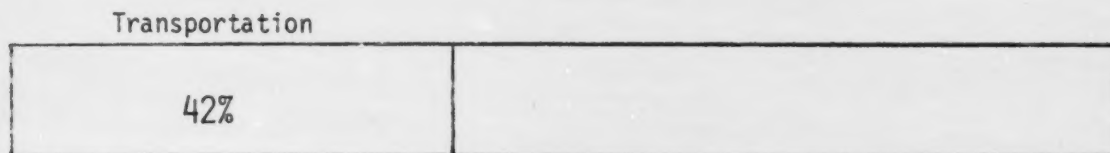
PART II: MY ATMOSPHERE

THE POLLUTION SOURCES, LISTED BELOW WITH THEIR APPROXIMATE PERCENTAGE OF CONTRIBUTION TO THE TOTAL AIR POLLUTION, ARE COMMONLY THOUGHT OF AS THE MAIN SOURCES OF POLLUTION.

1. TRANSPORTATION	42%	<u>42%</u>
2. STATIONARY FUEL COMBUSTION	21	<u> </u>
3. INDUSTRIAL OPERATIONS	14	<u> </u>
4. REFUSE DISPOSAL	5	<u> </u>
5. MISCELLANEOUS	<u>18</u>	<u> </u>
TOTAL	100	100

PROBLEM 1: YOU FIND CUMULATIVE PERCENT BY ADDING THE PERCENTAGE OF EACH ITEM TO THE PERCENTAGE OF THE ITEM BEFORE IT. FILL IN THE CUMULATIVE PERCENT COLUMN IN THE TABLE ABOVE. NOTE: YOU WILL FIND THESE NUMBERS USEFUL WHEN MAKING THE DIVIDED BAR GRAPH.

PROBLEM 2: THE BAR BELOW IS DRAWN AGAINST THE PERCENT SCALE. USING THE CUMULATIVE PERCENTS FROM PROBLEM 1, DRAW A VERTICAL LINE AT THE APPROPRIATE PLACE AND LABEL THE SECTIONS TO REFLECT THE CONTENT OF THE TABLE. USE COLORED PENCILS IF AVAILABLE.)



PROBLEM 3: ANSWER THE FOLLOWING QUESTIONS:

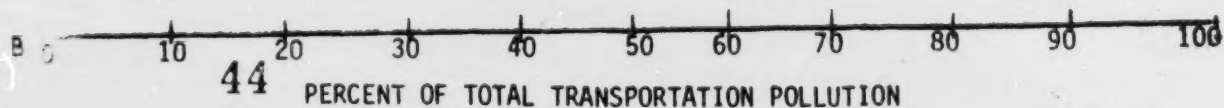
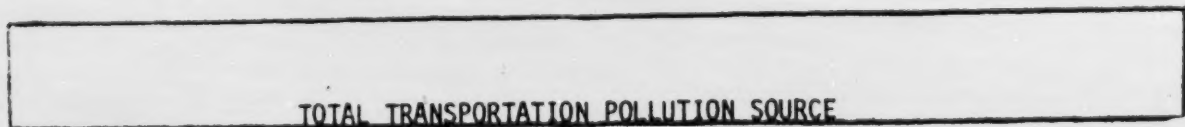
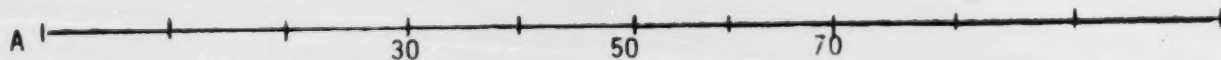
1. WHICH SOURCE LISTED CAUSES THE LEAST POLLUTION? _____
2. WHICH SOURCE OF POLLUTION IS HALF AS SERIOUS AS TRANSPORTATION?

3. WHICH SOURCE IS ABOUT ONE THIRD AS SERIOUS AS TRANSPORTATION?

4. WHICH SOURCE IS THE MOST SERIOUS AIR POLLUTER? _____
5. IF FIFTY PERCENT OF THE TWO WORST AIR POLLUTERS COULD BE ELIMINATED, WHAT PERCENT OF THE TOTAL POLLUTION COULD BE ELIMINATED? _____

PROBLEM 4: TRANSPORTATION IS THE MOST SERIOUS POLLUTION SOURCE, ACCOUNTING FOR 51% OF THE TOTAL AIR POLLUTION. SUBDIVIDE THE 51% TRANSPORTATION SEGMENT TO REPRESENT THE KINDS OF TRANSPORTATION AVAILABLE AND THE PERCENTAGE EACH KIND CONTRIBUTES TO AIR POLLUTION. USE THE FIRST TWO COLUMNS OF THIS CHART FOR THIS.

Transportation Using Fuels	%	Total Pollution Accumulated	Total Transportation Pollution	
			% of total trans.	% accumulated
1. AIRPLANE	7.2			
2. AUTO	32.0			
3. TRAIN	5.7			
4. MOTORBIKE	4.0			
5. BOAT	1.6			
6. SNOWMOBILE	.5			
TOTALS		51 %	100.0	100 %



STUDENT WORKSHEET
(TEACHER EDITION)
PART II: MY ATMOSPHERE

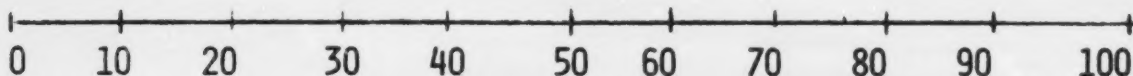
THE POLLUTION SOURCES, LISTED BELOW WITH THEIR APPROXIMATE PERCENTAGE OF CONTRIBUTION TO THE TOTAL AIR POLLUTION, ARE COMMONLY THOUGHT OF AS THE MAIN SOURCES OF POLLUTION.

1. TRANSPORTATION	42%	<u>42%</u>
2. STATIONARY FUEL COMBUSTION	21	<u>63</u>
3. INDUSTRIAL OPERATIONS	14	<u>77</u>
4. REFUSE DISPOSAL	5	<u>82</u>
5. MISCELLANEOUS	<u>18</u>	<u>100</u>
TOTAL	100	100

PROBLEM 1: YOU FIND CUMULATIVE PERCENT BY ADDING THE PERCENTAGE OF EACH ITEM TO THE PERCENTAGE OF THE ITEM BEFORE IT. FILL IN THE CUMULATIVE PERCENT COLUMN IN THE TABLE ABOVE. NOTE: YOU WILL FIND THESE NUMBERS USEFUL WHEN MAKING THE DIVIDED BAR GRAPH.

PROBLEM 2: THE BAR BELOW IS DRAWN AGAINST THE PERCENT SCALE. USING THE CUMULATIVE PERCENTS FROM PROBLEM 1, DRAW A VERTICAL LINE AT THE APPROPRIATE PLACE AND LABEL THE SECTIONS TO REFLECT THE CONTENT OF THE TABLE. USE COLORED PENCILS IF AVAILABLE.)

Transportation	Stationary	Industrial	Refuse	Misc.
42%	21	14	5	18

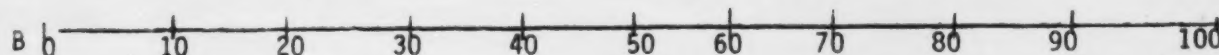
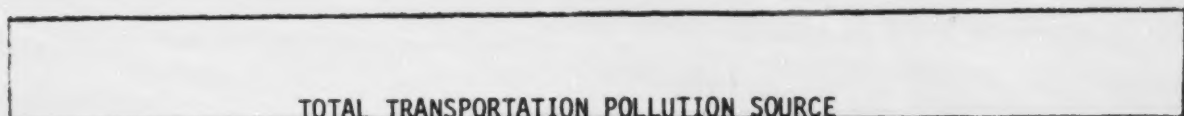
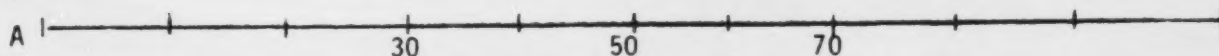


PROBLEM 3: ANSWER THE FOLLOWING QUESTIONS:

1. WHICH SOURCE LISTED CAUSES THE LEAST POLLUTION? refuse disposal
2. WHICH SOURCE OF POLLUTION IS HALF AS SERIOUS AS TRANSPORTATION?
stationary
3. WHICH SOURCE IS ABOUT ONE THIRD AS SERIOUS AS TRANSPORTATION?
industry
4. WHICH SOURCE IS THE MOST SERIOUS AIR POLLUTER? transportation
5. IF FIFTY PERCENT OF THE TWO WORST AIR POLLUTERS COULD BE ELIMINATED, WHAT PERCENT OF THE TOTAL POLLUTION COULD BE ELIMINATED? 31.5 (32)

PROBLEM 4: TRANSPORTATION IS THE MOST SERIOUS POLLUTION SOURCE, ACCOUNTING FOR 51% OF THE TOTAL AIR POLLUTION. SUBDIVIDE THE 51% TRANSPORTATION SEGMENT TO REPRESENT THE KINDS OF TRANSPORTATION AVAILABLE AND THE PERCENTAGE EACH KIND CONTRIBUTES TO AIR POLLUTION. USE THE FIRST TWO COLUMNS OF THIS CHART FOR THIS.

Transportation Using Fuels	%	Total Pollution Accumulated	Total Transportation Pollution	
			% of total trans.	% accumulated
1. AIRPLANE	7.2	7.2	13.8	13.8
2. AUTO	32.0	39.2	63.2	77.0
3. TRAIN	5.7	44.9	11.3	88.3
4. MOTORBIKE	4.0	48.9	7.8	96.1
5. BOAT	1.6	50.5	3.0	99.1
6. SNOWMOBILE	.5	51.0	.9	100
TOTALS		51 %	100.0	100 %



46 PERCENT OF TOTAL TRANSPORTATION POLLUTION

PROBLEM 5: CONSIDERING ONLY TRANSPORTATION POLLUTION AND READING FROM THE PERCENT OF TOTAL TRANSPORTATION LINE B, ESTIMATE THE PERCENT EACH KIND OF TRANSPORTATION CONTRIBUTES TO TOTAL TRANSPORTATION POLLUTION SOURCE. FILL IN THE THIRD AND FOURTH COLUMN OF THE CHART ON THE PRECEDING PAGE.

PROBLEM 6: THE FOLLOWING CHART COMPARES THREE KINDS OF TRANSPORTATION FOR A 500 MILE TRIP: PLANE, AUTO, AND TRAIN. THERE ARE 240 PEOPLE TO BE MOVED. WITH FOUR PEOPLE PER CAR, 60 CARS ARE REQUIRED. THE THIRD COLUMN INDICATES HOW MUCH ENERGY IS REQUIRED FOR EACH MODE OF TRAVEL. FILL IN THE FOURTH COLUMN INDICATION HOW MUCH ENERGY (CALORIES) PER PERSON WAS NEEDED FOR THE TRIP. (ROUND OFF YOUR ANSWER TO TENTHS.)

Kind of travel	Miles traveled	Passengers	Gas needed	Gallons per person	Pounds of CO pollution	Pounds of CO per person
1 plane	500	240	500			
60 cars	500	240	2525			
1 train	500	240	600			

PROBLEM 7: APPROXIMATELY 3.2 POUNDS OF CARBON MONOXIDE (CO) IS RELEASED FOR EACH GALLON OF FUEL BURNED. HOW MANY POUNDS OF CO DID EACH KIND OF TRANSPORTATION PUT INTO THE AIR FOR THE 500 MILE TRIP? FILL IN THE TABLE, COLUMN 5.

PROBLEM 8: IF YOU WERE A PASSENGER HOW MANY POUNDS OF CO WOULD YOU HAVE PUT INTO THE AIR FOR EACH MODE OF TRAVEL? FILL IN COLUMN 6.

PROBLEM 5: CONSIDERING ONLY TRANSPORTATION POLLUTION AND READING FROM THE PERCENT OF TOTAL TRANSPORTATION LINE B, ESTIMATE THE PERCENT EACH KIND OF TRANSPORTATION CONTRIBUTES TO TOTAL TRANSPORTATION POLLUTION SOURCE. FILL IN THE THIRD AND FOURTH COLUMN OF THE CHART ON THE PRECEDING PAGE.

PROBLEM 6: THE FOLLOWING CHART COMPARES THREE KINDS OF TRANSPORTATION FOR A 500 MILE TRIP: PLANE, AUTO, AND TRAIN. THERE ARE 240 PEOPLE TO BE MOVED. WITH FOUR PEOPLE PER CAR, 60 CARS ARE REQUIRED. THE THIRD COLUMN INDICATES HOW MUCH ENERGY IS REQUIRED FOR EACH MODE OF TRAVEL. FILL IN THE FOURTH COLUMN INDICATION HOW MUCH ENERGY (CALORIES) PER PERSON WAS NEEDED FOR THE TRIP. (ROUND OFF YOUR ANSWER TO TENTHS.)

Kind of travel	Miles traveled	Passengers	Gas needed	Gallons per person	Pounds of CO pollution	Pounds of CO per person
1 plane	500	240	500	2.1	1600	6.7
60 cars	500	240	2525	10.5	8080	33.7
1 train	500	240	600	1.2	1920	8.0

PROBLEM 7: APPROXIMATELY 3.2 POUNDS OF CARBON MONOXIDE (CO) IS RELEASED FOR EACH GALLON OF FUEL BURNED. HOW MANY POUNDS OF CO DID EACH KIND OF TRANSPORTATION PUT INTO THE AIR FOR THE 500 MILE TRIP? FILL IN THE TABLE, COLUMN 5.

PROBLEM 8: IF YOU WERE A PASSENGER HOW MANY POUNDS OF CO WOULD YOU HAVE PUT INTO THE AIR FOR EACH MODE OF TRAVEL? FILL IN COLUMN 6.

OPTION #1

STUDENT WORKSHEET

PART III: MY CAR - MY SHARE OF AIR POLLUTION

EMISSIONS OF AIR POLLUTANTS BY AVERAGING AUTOMOBILE ENGINES PER 100 GALLONS OF GASOLINE IS LISTED IN THIS TABLE.

<u>POLLUTANT</u>	<u>QUANTITY IN POUNDS</u>
CARBON MONOXIDE	320
HYDROCARBONS	42
NITROGEN OXIDES	5
SULFUR OXIDES	1.7
PARTICULATES	<u>0.03</u>
TOTAL	368.73

DO THE FOLLOWING PROBLEMS; KEEP AN OPEN MIND AS TO YOUR RESPONSIBILITY FOR AIR POLLUTION.

PROBLEM 1: HOW MANY MILES DID THE CARS IN YOUR FAMILY TRAVEL LAST YEAR?
Total _____

PROBLEM 2: HOW MANY MILES PER GALLON DO THE CARS IN YOUR FAMILY AVERAGE? NOTE: IF YOU HAVE TWO AUTOS CHOOSE A NUMBER THAT IS 1) BETWEEN THE TWO AVERAGES; AND 2) THE NUMBER SHOULD BE IN PROPORTION TO THEIR USE. each driven 1000 miles A = 5 MPG B = 10 MPG Average = 7.5 MPG

PROBLEM 3: TOTAL MILES DRIVEN IN ONE YEAR _____ DIVIDED BY THE AVERAGE MILES PER GALLON _____ WILL GIVE YOU HOW MANY GALLONS OF GASOLINE THE FAMILY CAR(S) USED LAST YEAR? _____

PROBLEM 4: NOW YOU ARE READY TO USE THE TABLE ABOVE TO CALCULATE THE POUNDS OF POLLUTANTS PRODUCED BY YOUR FAMILY CAR LAST YEAR. ENTER YOUR TOTAL GALLONS USED (PROBLEM 3) IN THE FIRST SPACE OF EACH CALCULATIONS, MAKE THE CALCULATION, AND WRITE YOUR ANSWER IN THE SPACE TO THE RIGHT.

- a. _____ X $\frac{320\# \text{ of carbon monoxide}}{100 \text{ gallons}}$ = _____ # of carbon monoxide
- b. _____ X $\frac{42\# \text{ of hydrocarbons}}{100 \text{ gallons}}$ = _____ # of hydrocarbons
- c. _____ X $\frac{5\# \text{ of nitrogen oxide}}{100 \text{ gallons}}$ = _____ # of nitrogen oxides
- d. _____ X $\frac{1.7\# \text{ of sulfur oxides}}{100 \text{ gallons}}$ = _____ # of sulfur oxides
- e. _____ X $\frac{0.03\# \text{ of particulates}}{100 \text{ gallons}}$ = _____ # of particulates

PROBLEM 5: FIND THE TOTAL OF ALL THE POLLUTANTS YOUR CAR HAS DEPOSITED IN THE AIR BY ADDING THE RIGHT HAND COLUMN. FILL IN THIS BLANK: MY FAMILY CARS HAVE DEPOSITED _____ POUNDS OF AIR POLLUTANTS INTO THE AIR LAST YEAR.

NOTE: IF YOU ARE NOT CERTAIN HOW MANY MILES YOUR FAMILY DRIVES IN A YEAR, A USEFUL NUMBER OF MILES IS BETWEEN 12,000 TO 18,000. THIS MEANS ABOUT 1000 TO 1500 MILES PER MONTH, WITH TRIPS AVERAGED IN. A GOOD NUMBER TO USE FOR AVERAGE MILES PER GALLON IS GIVEN IN THE FOLLOWING LIST OF AVERAGE ESTIMATED MILES PER GALLON.

AMERICAN MOTORS

Gremlin	25
Hornet	22
Matador	18

BUICK

Apollo	20
Skylark	21
Skyhawk	23
Century	22
LaSabre	14
Estate	
Wagon	12
Electra	13

<u>CADILLAC</u>	14
-----------------	----

CHEVROLET

Vega	26
Monza	26
Nova	18
Camaro	19
Impala	16
Wagon	13
Corvette	15

CHRYSLER

Cordoba	15
C. Sedans	15
Imperial	13
Datsun	32

DODGE

Dart	18
Monaco	15
Wagon	14

FORD

Pinto	28
Mustang	24
Maverick	17
Granada	18
Sedans	14
Wagons	12

LINCOLN-MERCURY

Comet	16
Montego	15
Mercury	13
Wagon	12
Continental	13

OLDSMOBILE

Omega	18
Starfire	23
C. Wagon	16
Olds 98	14
Toronado	14

PLYMOUTH

Valiant	20
Fury	15
Wagon	15

PONTIAC

Astre	26
Firebird	16
Grand AM	16
Sedan	15
Wagon	13

TOYOTA

Corolla	30
Corona	26
Celica	25

VOLKSWAGEN

Beetle	30
Rabbit	35
Dasher	32

VOLVO

240	20
245 Wagon	22
260	20

PART IV: PART OF THE 283 MILLION TONS IS MINE

THIS IS A SUMMARY OF AIR POLLUTION FROM VARIOUS SOURCES. SIMPLY READ THE TOP LINES AS TO KINDS OF POLLUTION; THEN READ THE SIDE NOTES AS TO WHERE THE POLLUTANTS COME FROM. NOW TOTAL THE NUMBERS DOWN AND THEN ACROSS. THE LOWER RIGHT CORNER NUMBER SHOULD BE 283.

MILLIONS OF TONS OF POLLUTANTS

Source of Pollutants	Carbon Monoxide	Sulfur and Nitrogen	Hydro-carbons	Particulates	Totals
90 MILLION CARS give pollution from exhaust pipe, crankcase, gas tank, carburetor	112	12	20	1	
FACTORIES AND FUEL - pulp and paper mills, iron and steel mills, refineries, electric power plants, chemical plants, private homes, public buildings	14	42	6	22	
REFUSE DISPOSAL AND MISC. Each person creates 1800 pounds of waste per year.	26	3	11	14	
TOTALS					

OPTION #2

MATERIALS AND RESOURCES

Propaganda Table, included
Miscellaneous magazines and newspapers

PROCEDURE:

1. The purpose of this option is to show that we must exercise great care to prevent our attitudes, values, and various predispositions from having a negative effect on the quality of our decisions. We must be on our guard against the enemies of logical thought. A good example of how our emotional mechanisms are "manipulated" can be seen in some of the activities of the advertising industry. Prior to the lesson, collect and mount a number of ads from magazines and newspapers. These ads should illustrate all, or at least a representative number, of the propaganda gimmicks listed in the table included at the end of this option. Number the ads to facilitate communication during the discussion phase of the lesson. Have available, for your own ready reference, a key that identifies the various gimmicks employed within each ad. Some ads may contain several.
2. On the first day of the lesson, distribute the ads to the class. Prepare enough so that there will be at least one for each student in the class. Encourage them to exchange ads and discuss them informally. You may wish to have them work in small groups. In the initial stage you might ask them to comment on which ones seem to be the most effective, the most persuasive, and the like. During the discussion negative comments will be made about some (or most) of the ads. Having explored some of these negative aspects, ask the class to identify ways in which advertisers work on our attitudes in order to create a need for their products. Although the students will make some interesting observations, they will probably be unable to hang labels on the various devices at work within the ads.
3. Before the end of the hour distribute thermofax or dittoed copies of the table of propaganda devices (one to each student). Survey the list briefly and ask them to study the definitions and illustrations carefully before the next class period. In addition, have them collect magazines and newspapers for further examination.
4. At the beginning of the second period make sure that the class understands the terminology, the definition, and the illustrations. The time needed for this will vary depending on the group. Then, using the same ads employed in the first session, have them identify, by name, the devices or gimmicks at work within the ads. Ask them to note that in many instances the devices will overlap to the extent that it is often difficult to differentiate between them. Be sure to make the point that we are being worked on by an extremely complex and subtle industry, and that to avoid being manipulated, we must exercise careful judgment, rather than emotion and prejudice, in deciding what goods and services we really ought to spend money for.

OPTION #2 cont.

5. The next part of the lesson (third day) can be handled in a number of ways. As an evening exercise (or as a classroom exercise) have the students search through their magazines and newspapers for ads that they wish to call attention to. They might, for example, seek out some ads that are genuinely fair or honest, and some that are particularly devious. Or perhaps they might simply find ads that combine devices in the most interesting way. At any rate, the search can be followed by a number of student reports, by general discussion, or even by a written commentary on the morality of advertising or on the vulnerability of our own human nature. There is, of course, a danger in all of this. Care must be exercised so as not to condemn the whole advertising industry. It is rather to show that we must exercise discrimination in determining which ads are honest and which are not.

DISCUSSION QUESTIONS

1. Is there any evidence that our society (as an element in our general environment) is conditioning us to respond the way it wants us to?
2. What practices in the world of advertising make it difficult for us to make sound decisions as to what goods and services we really need?
3. What are some of the elements in human nature that make us so susceptible to advertising tactics?
4. Which advertising devices seem to be used most frequently?
5. Is there any evidence that the combining of devices in a given ad actually makes us more open to manipulation and thereby less able to exercise independent judgment?
6. Does advertising serve any genuinely useful purposes? Give examples.
7. What debt do we owe to the world of advertising as an element in our total environment?
8. What can we do to be more on our guard against fraudulent advertising?
9. What guidelines can you suggest that might keep advertising more "honest"?
10. How can we assure that our feelings, attitudes, and values will actually work for us rather than against us?

PROPAGANDA TABLE

1. Hasty Generalization - coming to a conclusion before all instances have been observed

Mary Simpson spoke to three people who thought that Minnesota was the greatest vacation spot they had ever seen. Therefore, Mary made resort reservations two years early because she was sure the place would be jammed.

2. Composition - assuming that because each part of a whole has a certain characteristic, then the organized whole will have that same characteristic

Disc Jockey: "The performance of Beethoven's 'Archduke Trio', which you are about to hear, must be the greatest ever recorded, because the artists, Rubenstein, Heifetz, and Feuermann, are the greatest solo performers on their respective instruments.

3. Division - assuming that what is true of an organized whole will necessarily be true of each part

Dealer: "Since the Dashmobile is the best automobile made in America, the battery in the Dashmobile must be the best battery made in America."

4. Special Pleading - elaborating factors favorable to our side and refraining from mentioning the unfavorable ones

Candidate: "The Democrats have to their discredit two world wars and an undeclared war, tax scandals, and general mediocrity. The Republicans have to their credit the integrity of Lincoln, fifty years of peace before Wilson, progressive growth under Theodore Roosevelt, and prosperity under Coolidge. Therefore, vote Republican."

5. Black-or-White Fallacy - assuming that in any argument there are only two alternatives and no more

Salesman: "Either you'll go on spending a fortune keeping your old car running, or you'll check out the deal we have for you at Dilley's Rentakar. Obviously, Dilley's is the only alternative."

6. Meaning from Association - trying to establish the worth of an argument or product by associating it with what is really unrelated to it

Two students were arguing whether the Morgan or the Riley was the better automobile. Said one student, "The Morgan must be better, for Dr. Samuel S. Smothers, the famous brain surgeon, has driven a Morgan for many years and will have no other make of car."

7. Repeated Assertion - substituting repetition of an idea for proof of the idea

Advertisement: "Pure cured ham, that's good food. Pure cured ham, that's Callaway's canned ham. Callaway's pure cured ham bakes easily, and its pure cure remains to delight your taste as only Calloway's pure cure can."

8. Prestige Jargon - substituting impressive language for logic

When a plumber inquired of an expert if hydrochloric acid could be used to clean clogged drains, he got this reply: "The efficacy of hydrochloric acid is indisputable, but the corrosive residue is incompatible with metallic permanence."

9. Confident Manner - using gestures and positive language instead of presenting sound evidence

General Sales Manager to Board of Directors: "Even though the fiscal year is just beginning, you have the profits practically in your pockets. The sales are as good as made."

10. Cliche' Thinking - using proverbs and trite sayings instead of arguments

John has had an upset stomach for sometime. Hoping to avoid high medical expenses, he orders an apple for breakfast each morning. He does this because he has heard that an apple a day keeps the doctor away.

11. Misuse of Emotional Words - appealing to emotion rather than to intellect

Advertisement: "Don't be duped by peddlers of cheap substitutes. Experience the ecstasy of sleeping on a 'Cloudhyme' mattress."

12. Attitude Fitting - appealing to the known sentiments of another person or small group

During a political campaign, a salesman made a point of wearing a Republican badge when calling on his republican clients and a Democratic badge when visiting Democratic customers.

13. Misuse of the Mean - accepting a position simply because it is moderate with respect to more extreme positions

A spokesman for a large college says: "The state university has 25,000 students, which makes it too impersonal. The local college has only about 1,000 students, which means that its course offerings are too limited. Now our school has an enrollment of just over 12,000. At Moderation U. we can provide a well rounded educational experience."

14. Contradictory Assumptions - a situation in which two assumptions appear, neither of which can be true in the presence of the other

Speaker who advocates a society almost completely planned and administered by a central government: "Let the Government manage your affairs so that you may have more time to enjoy liberty and freedom to do as you wish."

15. Oversimplification - stating an argument in terms that are too simple to take all issues into account

Commercial: "All you have to do to guarantee that promotion is to make an attractive appearance. 'Hold Tight' hair spray will give you that extra margin."

16. Non Sequitur - assuming that a particular act or condition will automatically lead to a particular result

A law degree from Harvard is taken as assurance that a man who earns that degree will necessarily become a successful judge.

17. Equivocation - using the same word in two different senses

A man who is democratic is greatly to be admired. Jones has always voted the Democratic ticket. Therefore, Jones is greatly to be admired.

18. Leading Question - tricking a person into admitting something he may not wish to

Salesman for a lock company: "Can you afford to have your building accessible to burglars?"

19. Lifting out of Context - selecting only part of a quotation in such a way as to distort the original meaning

Book review in the New York Bugle: "The only mystery about this mystery is where the mystery is. It is about as subtle as a gangster with a teeny gun and about as electrifying as the shock of a flashlight battery."

Ad on book jacket: New York Bugle says, "this book is . . . mysterious, . . . electrifying, . . . shocking!"

20. Bandwagon - appealing to the follow-the-crowd instinct

Advertisement: "Join the thousands of golfers who have switched to Nifty Knickers."

OPTION #3 - 3-5 days

MATERIALS AND RESOURCES

"Planning the Human Community" (simulation game)

PROCEDURE:

1. You must study the printed rules very carefully before attempting to play this game. For the most part the rules are self-explanatory, and you may play the game as directed by the manual. For the purposes of understanding #15, however, a few modifications are suggested. Instead of presenting the eight filmstrips and cassettes prior to the actual simulation game, you might consider using them as a follow-up device. By playing the game with minimal preliminary explanation, the students will come to realize that their personal feelings (in some cases prejudices) play a significant part in their decision-making processes. The assumption here is that they can best achieve this realization the hard way; that is, by making mistakes. The ideas set forth in the strips and tapes will probably be more meaningful after the students have experienced the frustrations of trying to plan a community when they are trampling on each other's values.
2. As a second modification you might assign roles. There are enough materials so that as many as four simulation games may be played at the same time. In each of the four groups you may assign one person to represent the power company's interests, another to push for wildlife preserves, and so on. Vested interests will soon create some heated confrontations. They will find that it is very difficult 1) to stay within an allotted budget, 2) to establish a meeting of the minds where individual needs are concerned, and 3) to maintain environmental quality. As each of the four communities is planned, have that group work out its Environmental Impact sheet. They will probably find that they have missed the "ideal" by a wide margin.
3. At this point (third day?) make use of the strips and tapes. It may not be necessary to use all of them. You might use tape #1 and one or two others as deemed necessary. Another method is to separate the members of the class into vested interest areas and have each group view the strip that pertains most closely to its own area. Then, return them to their original planning groups for one more simulation game.
4. Prior to this follow-up game you may wish to ask one member of each group to serve as a mediator. Do this secretly so that the other members of the group are unaware of his assignment. In this game most of the mistakes made during the first game should be avoided and the Environmental Impact graph should come much closer to the "ideal".
5. Either through discussion or through an essay assignment, have the students explore the problem of putting forth a co-operative effort when conflicting attitudes and values are involved. Still another method of clarifying this issue is to have each of the four mediators identify for the class the problems that his group ran into during the first game and tell what success the group had in avoiding those problems during the second game. The point should be made that it is necessary for one to consider very objectively both his own values and the values of others if decisions are to be co-operative rather than arbitrary.

Option #3 cont.

6. If time is a problem, the follow-up game may be dispensed with. At the end of the "first" game students could be asked to explain what they would do differently if they had another chance. Although this method is more hypothetical, the resulting comments should prove valuable.

DISCUSSION QUESTIONS (for follow-up discussion or for written assignment)

1. What specific problems did your group run into in planning the community?
2. To what extent were the problems caused by inflexibility in point of view?
2. Did the presence of a mediator help? (What are the implications of the answer?)
4. Do all communities have exactly the same needs?
5. In real life is the ideal balance possible? (Consider the categories on the budget sheet.)
6. Is this balance truly necessary?
7. How does the environmental quality of your simulation community compare with that of your own real-life community?
8. In the question of compromise, how do you draw the line between co-operation and the sacrificing of principle?
9. In real life what hope is there that co-operation can be achieved in community planning?
10. What have you learned about the way our attitudes and values influence our decisions?

DECISIONS 17

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to list the reasons why a more effective environmental decision can be produced by cooperative effort than by individual effort.

SUBJECT AREAS:

Science, Language Arts, Speech Arts, Social Studies

OPTION #1

MATERIALS AND RESOURCES

Butcher paper
Different colored magic markers
Simulation Game, Task Sheets
Yardsticks
Tape cassette

PROCEDURE:

1. Discuss the understanding to be developed.
2. Distribute Task A to students. Students are to list possible uses for vacant land on the task sheet.
3. Poll the students for their ideas and write them on the blackboard.
4. Divide the uses thought of by the individual students into categories, e.g. recreation, education, business, medical.
5. Divide students into groups to be responsible for a certain category, with one group of six set up as county commissioners.
6. Have the groups complete Task B. They should be able to do this in twenty minutes.
7. Now give them twenty minutes to prepare a visual presentation of their plan. They will then have three minutes to present to the County Board of Commissioners. Students should make visual and oral presentations.
8. The county board is to elect a chairperson. He and the members of the commission will evaluate the proposals presented to them according to criteria they set up while the groups are working on their presentations.
9. The board will make a decision and give their reasons for choosing a certain group's proposal over the others.
10. Explain how, although one proposal was accepted, by being an organized group they expressed themselves more clearly and effectively. And, they now have a solid group to help influence future environmental concerns.

DISCUSSION QUESTIONS

1. Do you feel people working together with similar interests can be more effective in influencing environmental decisions than individuals working alone? Why or why not?
2. Where is there any vacant land around here?
3. What could we use it for? Is this a good idea? Why or why not?
4. Let's look at Centerplace City. What are some possible uses of its vacant land. List, by yourself, some possible uses of the vacant farmland.

OPTION #1 cont.

5. What are the uses you have considered?
6. Which of these uses are similar? Why?
7. What label would you give to all of the listings you put in category A? Etc.
8. Who would like to work with group A? Etc.
9. Can anyone think of an advantage their proposal has to the land and the people? Why?
10. Now that you have listed the pros and cons of your proposal develop a strategy to present your plan to the public.
11. What do you think the Board of Commissioners job is?
12. What criteria should they use to choose the best land proposal?
13. Is it better to have just one person or several on the Board of Commissioners? Why?
14. How did everyone contribute during the strategy session?
15. Why did this make for a better presentation?
16. How many people are glad they had other people working with them on this project? Why?
17. Why can you do more as a group?

TASK A: (10 minutes) Work by yourself

Read the background information for Centerplace City, and then list some possible uses of the vacant farmland.

"One square mile of unused county farmland, four miles northeast of the city is now available for the city's use."

BACKGROUND INFORMATION SHEET: CENTERPLACE CITY

The population is 250,000 and increasing.

The city's boundaries are being extended, but the suburban fringe is expanding even more rapidly.

The rapid population growth means more housing, city services, and recreational areas.

Power, public transportation, and a skilled labor force are available.

The city is located near forests, which are to the north.

The land to the east is devoted mainly to farming.

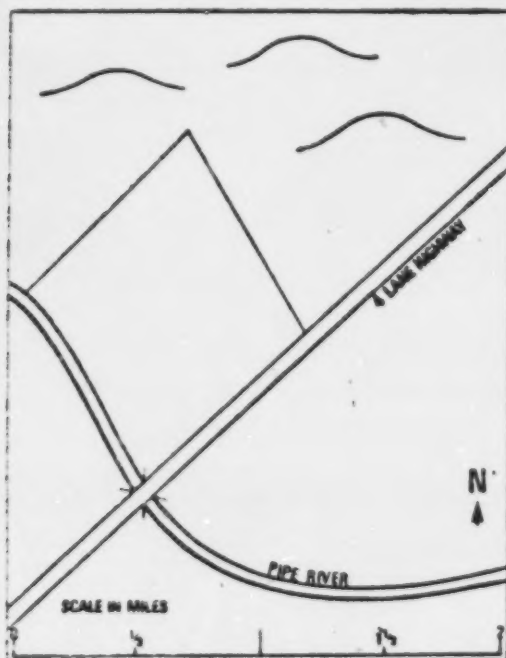
The Pipe River is unpolluted and is the source of irrigation water and the municipal water supply.

The river is too small for freight transportation, but logs could be floated on it.

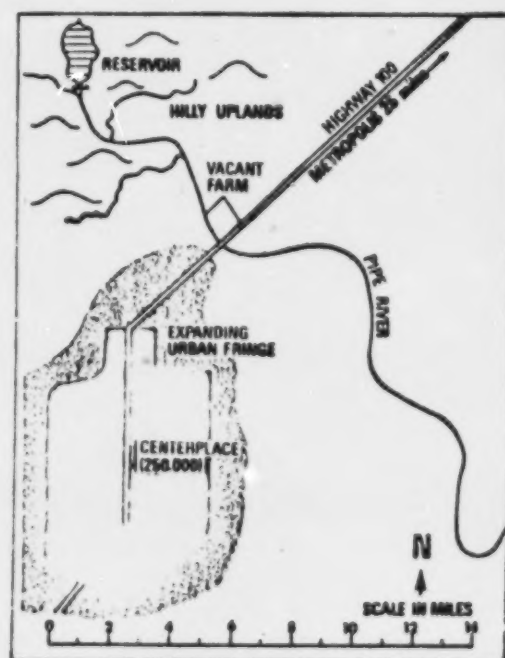
The gravel bed of the river is appropriate raw materials for concrete manufacture.

The present sewage plant and garbage area are at capacity. The citizens of Centerplace are concerned about the maintenance of a scenic region.

The County Board of Control is the authority for land zoning, and many citizens' groups are trying to influence zoning decisions.



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Task A: List possible uses of the land below:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Task B: Your task is to analyze and list possible consequences of different land uses within your assigned land use category.

Use	Advantages to land/people	Disadvantages to land/people

Task C: Develop a strategy and method to present your plan of development to the County Board of Commissioners or appropriate local authorities. Use large sheets of paper and magic markers.

OPTION #2

MATERIALS AND RESOURCES

Problem-solving outline

One copy for each six students of SIX BITS

One copy for each eight students of EIGHT BITS SSB

PROCEDURE:

1. On the first day introduce and discuss the problem-solving outline and then hand out the problem, Six Bits, one set of data to each group of six. If you don't have an easily divisible number, have observers or use one or two groups of five.
2. Discuss questions 1 through 3.
3. On the second day divide the class into groups of eight. Try to divide into evenly distributed groups as far as leaders, etc.
4. Do the EIGHT BITS SSB and discuss questions 4-9.

DISCUSSION QUESTIONS

1. What kept you from solving the problem to begin with?
2. What helped you to solve the problem later?
3. Three things occurred during this exercise:

TRUST - You had to trust that I gave you a solvable problem and you had to trust each other to give all the information.

POLITE LISTENING - Casual, not caring because what is being said doesn't mean anything to you at the moment.

REAL LISTENING - When it all starts to mean something and you ask people to repeat and try to understand and remember what they said.

4. The problem could not be solved without the contributions of each person in the group.
5. People feel more like part of a group if they contribute by saying something and having others listen and respond positively.
6. It is easier to talk to each other in a small group than to talk to one instructor in front of a large group.
7. A leader usually appears in every group working toward a common goal.
8. Each person in a group brings information and skills that can be used by the entire group to solve common problems. The pieces of paper represented the information and skills that each of you brought to the group.
9. NONE OF US IS AS SMART /S ALL OF US is the key to this exercise. But, remember that too large of a group is bad also.

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PROBLEM-SOLVING OUTLINE

I. Defining the issues:

The basic problem must be determined from among many related problems.

For example: Jimmy got hit by a car

We always play ball in the street.

There is no place in our neighborhood to play ball.

The basic problem is lack of an appropriate place to play ball.

II. Collecting data:

Find out all the possible areas for play.

III. Determining alternative solutions:

How can we set up a ballfield?

IV. Evaluating solutions:

Which is the best available place?

V. Developing a plan of action:

How are we going to make it into a ballpark?

VI. Action phase:

Do what we decided needs to be done.

TEACHER'S NOTE: This outline is best explained using examples of problems relevant to the students of your area. For example: the lunch program or see problem-solving guidelines.

SIX BITS

GENERAL DIRECTIONS: Cut on the lines and distribute one section to each student in a group of six.

BIT 1 - YOU MAY TELL YOUR GROUP WHAT IS ON THIS SLIP BUT YOU MAY NOT PASS IT AROUND FOR OTHERS TO READ.

The Dinosaurs had Tom for a teacher during the third period.

Dick and Belinda did not get along well and so they did not work together.

During the first period the Team Leader taught the group that Harry liked best.

BIT 2 - YOU MAY TELL YOUR GROUP WHAT IS ON THIS SLIP BUT YOU MAY NOT PASS IT AROUND FOR OTHERS TO READ.

All teachers taught at the same time and exchanged groups at the end of the period.

Each teacher liked a different group best. During the second period each teacher taught the group he/she liked best.

Each teacher taught every group during one of the four morning periods.

BIT 3 - YOU MAY TELL YOUR GROUP WHAT IS ON THIS SLIP BUT YOU MAY NOT PASS IT AROUND FOR OTHERS TO READ.

The Lakes School's Team Teaching Unit has two teacher's aides, four teachers, and four groups of students.

Each group had chosen its own name.

Sybil was the Team Leader for the Team Teaching Unit.

BIT 4 - YOU MAY TELL YOUR GROUP WHAT IS ON THIS SLIP BUT YOU MAY NOT PASS IT AROUND FOR OTHERS TO READ.

Your group members have all the information needed to find the answer to the following question:

IN WHAT ORDER DID THE APES HAVE THEIR VARIOUS TEACHERS DURING THE MORNING PERIODS?

Only one answer is correct. You can find it. Some of the information your group has will not help solve your problem.

NONE OF US IS AS SMART AS ALL OF US!

BIT 5 - YOU MAY TELL YOUR GROUP WHAT IS ON THIS SLIP BUT YOU MAY NOT PASS IT AROUND FOR OTHERS TO READ.

Belinda and Ralph disagreed about how it would be best to handle the Bombers who had trouble settling down to work.

Dick liked the Champs best.

Even though the Team Leader had been at Lakes School for five years, this was a shorter time than for the other team members.

BIT 6 - YOU MAY TELL YOUR GROUP WHAT IS ON THIS SLIP BUT YOU MAY NOT PASS IT AROUND FOR OTHERS TO READ.

The Team Leader taught the Dinosaurs the second period.

Harry worked with the Bombers in the third period.

Sybil had been at Lakes School a shorter period of time than any of the other teachers in the Team Teaching Unit.

PROBLEM-SOLVING

1. Have class arrange themselves into groups of eight.
2. Pass out the EIGHT BITS of information problem, one bit of information to each person in a group.
3. Tell the class that there is a problem to solve. They can tell their group what is on their paper. They must NOT show it to the others.

DEFINING ISSUES: The Chain of Lakes is polluted.

COLLECTING DATA: Area soil cannot properly absorb water from septic tanks.
Septic tanks run off into lakes.
Farmer fields run off into lakes.
Weeds thrive from fertilizer from farmlands and human waste.
Boaters dump human waste into lakes plus garbage, etc.
Garbage landfill is located in marshy area.
Garbage contaminates marsh water that runs into the lake.
Laundry water returns to lakes full of phosphates.
Phosphates make algae grow.
Some algae is harmful if out of proportion to the environment.
Decaying weeds take out oxygen from water.
Fish are a part of the natural order.
Game fish need balanced environment.
Scavenger fish (carp) can thrive on anything.
Scavenger fish stir up eggs and eat game fish.
Boat propellers chop up fish.
Oil and gasoline spills kill fish.

DETERMINING
SOLUTIONS:

Ban motorboats.
Dredge lake to make it deeper.
Aerate lake by pumping air into weedy areas.
Pump in weed killer.
Cut weeds.
Drain lakes, clean out and fill.
Eliminate all septics on lakefronts.
Educate public on causes of pollution in the chain.
Move dump from marsh to higher land.
Cut out use of phosphate detergents.
Limit horsepower of motors.

CHOOSING A PLAN
OF ACTION:

Educate the public. Write information booklets, canvas lake neighborhoods, test lakes, write news articles.

PROBLEM SOLVING THE CHAIN OF LAKES

SSB 1

Although you may tell your group what is on this slip, you may not pass it around for the others to read.

INFORMATION:

There is too much silt built up on the bottom of the lakes in the Chain.
Area soil cannot properly absorb water from septic systems.
Ban motorboats.
Cut the weeds.

SSB 2

Although you may tell your group what is on this slip, you may not pass it around for the others to read.

INFORMATION:

It is not always pleasant or safe to swim in the Chain of Lakes.
Septic tanks run off into the lakes.
Phosphates make algae grow.
Dredge the lake to make it deeper.

SSB 3

Although you may tell your group what is on this slip, you may not pass it around for the others to read.

INFORMATION:

Scavenger fish are growing out of proportion in the Chain of Lakes.
Farmer fields run off into the lakes.
Move dump from marshy area to higher land.
Aerate lake by pumping air into weedy areas of lake.

SSB 4

Although you may tell your group what is on this slip, you may not pass it around for the others to read.

INFORMATION:

Your group members have all the information needed to find the answer to the following:

- A. IDENTIFY THE ISSUE - Most members have a statement that is a problem in our area. Only one of these statements is the real issue or problem. State the issue.
- B. COLLECTING DATA - Each member has several statements of fact which are causes of the problem. List all data.
- C. DETERMINING SOLUTIONS - Each member has at least one possible solution to the problem. List all possible solutions.

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SSB 4 con't

D. CHOOSING A PLAN OF ACTION - Choose the best possible solution to the problem that your group could implement.

SSB 5

Although you may tell your group what is on this slip, you may not pass it around for others to read.

INFORMATION:

The Chain of Lakes is polluted.

Weeds thrive from fertilizer from farm fields and human waste.

Pump in weed killer.

SSB 6

Although you may tell your group what is on this slip, you may not pass it around for others to read.

INFORMATION:

Weeds are growing out of proportion.

Boaters dump human waste into lakes and garbage, etc.

Limit horsepower of motors.

Drain lakes, clean, line with sand bottoms and refill.

Game fish need balanced environment.

SSB 7

Although you may tell your group what is on this slip, you may not pass it around for others to read.

INFORMATION:

Garbage contaminates marsh water that runs into lakes.

Educate public on causes of pollution in the Chain through writing booklets, news articles, surveying lake neighborhoods and testing the lakes.

Laundry water returns to the lakes full of phosphates.

Some algae is harmful if out of proportion to the environment.

SSB 8

Although you may tell your group what is on this slip, you may not pass it around for others to read.

INFORMATION:

Oil and gasoline spills kill fish.

Boat propellers chop up fish.

Scavenger fish stir up eggs and eat game fish.

Scavenger fish (carp) can thrive on anything.

OPTION #3

MATERIALS AND RESOURCES

Filmstrip, "Solid Waste", available in the E² Office
Cameras and film
City map
Local trash dump or landfills
Local police and/or fire department
Department of Sanitation

PROCEDURE: The object of this project is to have the students develop a procedure for cleaning up their community.

1. Have the students identify the problem. Break them into groups and have them investigate different areas of the town looking for areas that are badly littered. Have them take photos, write a report, and map the problem areas.
2. What can be done about the problem? The students should develop some short term and long term goals to solve the problem. Let the students write the goals. You, as the teacher, should ask leading questions, but let the students come up with their own ideas. One of the short term goals should be to go out and clean up the littered areas. Hopefully, the students will have many other ideas, but the actual physical clean-up should be the center of this project.
3. How the students must decide how to go about solving the litter problem.
 - a. What materials will they need?
 - b. Who should they contact?
 - c. What about safety? (especially if littered areas are near roads or water)
 - d. Will trucks be necessary?
 - e. What will we do with the litter when we have picked it up? Where can we put it?
4. Let the students themselves outline the clean-up program but ask them leading questions to make sure they are headed in the right direction. For example, if the area to be cleared is near a road, you might ask, "What must be done to insure safety?" and hope that the students can outline a program to insure no injuries. They might wish to contact the police to direct traffic or they might want to learn methods of traffic control so they can handle it themselves. No matter what, remember, the students will be off the school grounds and exposed to some dangers they might not encounter at school. You can never be too careful.
5. Make sure the local news media are contacted. This is very definitely positive public relations.
6. Have students think of ways in which this problem can be avoided: posting signs, placing trash containers around, etc.
7. This project will vary greatly depending upon the area and the program which the students develop.

OPTION #3 cont.

DISCUSSION QUESTIONS

1. In which areas did you find the most litter?
2. Why is litter found in these areas?
3. What good has this project done?
4. What can we do to keep this litter problem from recurring?
5. Where does litter come from?
6. Could one person have done the job the whole group did?
7. Can a group decision be more beneficial than an individual decision?

DECISIONS 18

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to explain why it may be necessary to change a law in order to prevent environmental abuse.

SUBJECT AREAS:

Social Studies, Business

OPTION #1

MATERIALS AND RESOURCES

Film, "The Role of the Interest Group Leader, available E² Office
Glossary of terms
How Laws are Made Chart
Excerpt from the Sierra Club Bulletin, February 1977

PROCEDURE:

1. Introduce the terms on the glossary sheet so that the students understand them.
2. Show the film.
3. Discuss the film using the questions below:

DISCUSSION QUESTIONS

1. Do you feel that lobbying groups are in the best interests of the general public? Explain!
2. How does the lobbyist in the film present his case to the legislator?
3. What are the steps involved in changing a law?
4. Why do lobbyists work in Congress rather than in states?
5. What laws have had the most impact on our environment?
6. Why do we have to have special or new laws to protect people and the environment?
7. What should be the criteria to judge whether a law is good or bad?

GLOSSARY

CONGRESS - The law making body of government, composed of a senate and a house of representatives.

ECONOMIC GOAL - A goal with special emphasis placed upon economic gain.

ENVIRONMENTAL GOAL - A goal with special emphasis placed upon environmental gains.

INTEREST GROUP - An organization of companies or individuals with a special interest in a certain issue or problem (National Rifle Association, National Education Association, Sierra Club, Citizens for a Better Environment).

LOBBYIST - An individual working for an interest group. Through "discussion" the lobbyist attempts to persuade a decision-maker to vote a certain way on an issue.

REPRESENTATIVE - A member of the Congress (House of Representatives) serving a two-year term by popular vote. There is one representative for each 412,000 people in their state with a maximum of 435 representatives. As the population grows there will be more people per representative.

SENATOR - A member of the Congress (Senate) serving a six-year term. There are two elected from each state.

PAGES 72-76 "Legislative Scoreboard - the
94th Congress" and "The Right to Write"
removed prior to being shipped to EDRS
for filming due to copyright restrictions.

OPTION #2 - two hours

MATERIALS AND RESOURCES

Cameras
Telephone directory and telephone
Magazines

PROCEDURE:

1. Take a fieldtrip to a local business district along a major street in your community. If you have access to instamatic cameras, have the students take photos of the different types of signs (advertising) they see. Especially try to take photos looking down the road.

2. Have the students make a list of the different signs such as:

Large signs near the road
Large signs away from the road
Especially distracting or irritating signs
Signs on buildings, flush with the building
Number of signs for one building or business
Especially appealing or non-distracting signs

3. Have the students find pictures from magazines, or ideally take the photos themselves on a street where signs are limited in size, number, closeness to the road, and in general, functional but no distracting.
4. Let the students discuss the visual appeal of both types of streets, thinking about safety and aesthetics.
5. Contact your city government to find out if any sign ordinances are enforced by your community.
 - a. If your city has such an ordinance, what violators of the ordinance can you witness?
 - b. If your city has no sign ordinance, what suggestions for such an ordinance can you make?
6. This activity can be designed around many other issues:

Air pollution controls
Water pollution controls
Noise ordinances

Soil erosion ordinances
Non-returnable containers controls
(Such as in Oregon)

DISCUSSION QUESTIONS

1. Why do you think signs are bigger and bigger with more and more lights? Think of Las Vegas.
2. Do you think businesses will voluntarily limit the size, number, and locations of their signs? Why? Are laws and ordinances the only way of limiting signs?

OPTION #2 cont.

3. Think about traveling on rural roads compared to traveling on streets lined with businesses. How do you feel about looking around? What are the most dominant things to see?
4. How do signs play a part in drivers becoming distracted or irritated when they drive?
5. What ways can people make traveling through a city more relaxing and less eye straining, keeping in mind that businesses want to advertise?
6. Without any city ordinance limited signs, when do you think businesses will limit their signs (size and number)? Ever?
7. Observe how many billboards are along the street or in your pictures.
 - a. How can billboards be appealing or aesthetic?
 - b. Are the billboards safe or dangerous?
 - c. Are they really necessary for businesses? Do you feel billboards deteriorate the quality of your environment?
8. Would one or two clear, simple, appealing signs be nearly as functional as several, large neon signs for a business?
9. When does private advertising infringe on the public's right to a quality, appealing environment?

OPTION #3

MATERIALS AND RESOURCES

Slides, Photos, and data on the community, available E² Office

PROCEDURE:

1. Prepare the class for the simulation game concerning land use in Lake Pointe, using slides, photos, and discussion.
2. Arrange for some or all of the students to attend a city council meeting to observe the decision-making process.
3. The simulation game will proceed through the following steps:
 - a. Identification of the problem: A large estate on Lakeshore Drive bordering Lake LaForda has been sold to a real estate development company. A high rise luxury apartment building is planned for the site. The company is petitioning the City Council for a change in the zoning ordinance from R-1 (single family dwelling) to M-1 and 2 (multiple dwelling over three stories in height).
 - b. Factors having an influence on the decision:
 - (1) the aesthetic appearance and value
 - (2) the effect on other property
 - (3) the effect on the tax base
 - (4) the precedent setting nature of the decision
 - (5) the increase in population, traffic, and demand for municipal services
 - (6) the right of the property owner to make a profit on his investment
 - c. Assignment of roles:
 - (1) City Council - six members plus the mayor who presides and votes. (They should develop decision-making criteria based upon local zoning laws.)
 - (2) The Real Estate Development Company executives, architects, land use experts, other experts, and attorneys
 - (3) The local citizens and organizations who are opposed to the high rise apartment building
 - d. The game

The City council will listen to the presentations by both sides and will question each side. Provisions will be made for questions and answers between the two sides. When the council believes that sufficient information and opinions have been presented, they will discuss the problem. Following this a roll call vote will be taken on the action to change the land use or zoning laws as they apply to this property.

DISCUSSION QUESTIONS

1. Why do we have land use laws such as zoning ordinances?
2. What would happen in a community if there were no land use laws? Give examples of land abuse resulting therefrom.
3. How do aesthetic values relate to land use and zoning ordinances?
4. In what ways do customs and traditions affect land use laws?
5. How could an apartment building represent an environmentally sound use of land? An economically sound use?
6. In what ways can concerned and aware citizens prevent environmental abuse in the use of private land?